

*Special Feature* ■

## Presentation of the Morris F. Collen Award to William Edward Hammond II, PhD

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WILLIAM W. STEAD, MD

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The American College of Medical Informatics (ACMI) is an honorary society established to recognize those who have made sustained contributions to the field. Its highest award, for lifetime achievement and contributions to the discipline of medical informatics, is the Morris F. Collen Award. Dr. Collen's own efforts as a pioneer in the field stand out as the embodiment of creativity, intellectual rigor, perseverance, and personal integrity.

Once a year, when appropriate, the College gives its highest recognition to those whose attainments have, throughout their careers, substantially advanced the science and art of medical informatics. In 2003, the College was proud to present the Collen Award to Dr. William Edward Hammond II. Throughout his career, Ed has seen possibilities, and then figured out how to do whatever is needed to overcome challenges where others thought goals were unachievable. He is a pioneer in electronic health records and standards. He is a classic triple threat—breaking new scientific ground, developing young people, and providing services that make a difference in health care. He is at once an intense competitor and an effective collaborator. He is richly deserving of the recognition embodied in the Collen Award.

*Morrie Collen, MD, Emeritus Director of Research, Kaiser Permanente: "I congratulate Ed Hammond on receiving this award in recognition of his outstanding leadership and his significant technical contributions to medical informatics. I first learned of Ed's unusual technical abilities when he was working with Bill Stead at Duke University. Ed Hammond, an engineer, and Bill Stead, a physician, were an ideal pair for developing medical information systems. As early as 1969, using punch cards for some applications and a mini-computer, they*

*were developing what they called a generalized medical information system for community health. Professor and Doctor William Ed Hammond is truly one of the great pioneers in medical informatics."*

### Roots

Ed Hammond was born in Hendersonville, North Carolina, in 1935, to Alfred and Kate Hammond. His father worked in the cotton mill. Ed was Alfred and Kate's fifth child. His father died when Ed was 4 and his mother remarried to Hicks Maybin, a farmer in the Green River Mountains of western North Carolina. His 13 children, her five, and one they had together made for a large immediate family. The farm was what now would be called a truck farm. The family had no electricity or running water.

Ed started work at age 12 in a grocery store and, by his senior year in high school, he was working a full eight-hour shift at the cotton mill in addition to his course work. In 1953, Ed won an NROTC scholarship to Duke. He studied electrical engineering—in this vacuum tube era—spending his summers on navy cruises. He was elected to the Order of St. Patrick, received an armed forces communication award, and received an RCA best paper award. After graduating from Duke in 1957, Ed joined the Navy and went to Pensacola, Florida, for flight school. That October, he married Kay Stuart Forrester, a native of Durham, North Carolina. Ed continued active duty in the Navy until 1960, and during that period, became the Navy's first air intercept controller. In the fall of 1960, Ed returned to Duke as an instructor in electrical engineering (EE). While on the faculty, he completed a master's degree. During this time, he and Kay had two sons, William Edward Hammond III born in 1961 and Michael Lane Hammond born in 1963.

Ed joined the first class of the EE PhD program when it was established in 1964. He had two research mentors. The first was Tom Wilson, who was working with NASA on power converters for spacecraft. His dissertation advisor was Harry Owens and the topic was development of a correlation data processing for the IMP series of satellites. From 1964 through

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William Edward Hammond II, PhD.

1967, Ed experienced rapid changes in technology—as vacuum tubes were replaced by transistors, then large component integration, and then large-scale integrated circuits. He developed his interest in computers, programming first in machine language on the IBM 620. After completing his PhD, Ed spent two years in a special postdoctoral program that let him take selected preclinical courses in the School of Medicine before joining the initial faculty of the new program in biomedical engineering in 1968. That summer, he used a Link 8 computer to develop the first real-time visualization of the cardiac activation sequence mapped on the body surface—a problem that had proven to be unsolvable on mainframe computers. He joined the newly formed Department of Community Health Sciences, based 65% in the School of Medicine while retaining 35% in the School of Engineering.

*Eugene Stead, MD, Emeritus Chairman of Medicine, Duke University:* “Ed was always accommodating. He always wanted to do everything. So he agreed to do a great many things. In due time people appreciated the fact that if they got Ed interested, and he was easy to get interested, and it could be done in that unit, it would get done.”

*Harvey Estes, MD, Emeritus Chairman of Community and Family Medicine, Duke University:* “Ed made the system work. He rolled up his sleeves and got to work and he learned how to work with [patients] relatively uninitiated with the use of computers. And he began to work with opinionated doctors, who were sure it wouldn’t work anyway, and he made it work and he developed an entire medical information system which we used for many, many years after that.”

## Electronic Health Records

Ed Hammond’s interest in electronic health records began in 1969. He built a hardware interface between an optical scanner and a PDP-12 and wrote assembly language programs to print an initial medical history captured from the patient on mark sense forms. In the summer of 1970, he assembled a team of five medical and undergraduate students.



Dr. Hammond inserting a disk into PDP-11.

*Bill Stead, MD, Associate Vice Chancellor for Health Affairs, Vanderbilt University:* “We each built a part of a mini-computer system to take a history directly from a patient. We worked with production code and real patients. We made changes and immediately saw the effect on usability. We were given advice and the freedom to try, to fail, and to try again.”

By 1972, history and physical examination “takers” had been combined into a prenatal electronic health record that was operational at Duke until 2002. By 1973, practice management such as appointment scheduling and billing permitted an early outpatient clinical system with a computer-based record as its core. From this foundation, the team went on to build GEMISCH—a command line language running on top of RSX and VMS Operating Systems. Multiple site-specific applications were replaced with generic application programs. A dictionary of metadata provided for site-specific variation and entity–attribute–value data structures handled sparseness. The result—TMR—was in use at its peak in over 40 sites in 20 different settings, ranging from a two-person practice to a 60-bed cancer research hospital.

*Clem McDonald, MD, Regenstrief Professor of Medical Informatics, Indiana University School of Medicine:* “Ed Hammond has been a good friend since I met him in 1973 in his own development shop at Duke. At that time he was working on the development of an electronic medical record system, and had it installed

in the Community Health Department at Duke University. Ed is one of the real pioneers in medical informatics and a most knowledgeable developer. He built every important part of an electronic medical record and had it all working well before 1980. And he still has things built that are not now running widely in commercial systems."

## Standards

This variety led to Dr. Hammond's interest in standards. Beginning in 1983, Ed worked with Clem McDonald and others to create messaging standards for exchange of data among systems. The standard for the transmission of laboratory data was the first one adopted by the American Society for Testing and Materials (ASTM). Ed was a member of the group that formed Health Level 7 (HL7) in 1987, and he served as chair of that organization in 1990–1991 and again in 1996–1997. He played a major role in the integration of SGML/XML into HL7 and was instrumental in the creation of a number of Technical Committees and Special Interest Groups, including the Vocabulary, the Electronic Health Record, and most recently, the Patient Safety SIG.

*Stanley Huff, MD, Professor of Medical Informatics Intermountain Health Care and University of Utah:* "Ed believes in people saying what they need. If people will say what they need—what their needs and wants are—then it's possible to find mutual benefit and relationship and to found relationships on a solid foundation that will last. One of the sayings that I've picked up from Ed is that 'you can accomplish a lot if you don't worry about who gets the credit.'"

With the formation of the International Standards Organization (ISO) Technical Committee TC 215 Health Informatics, Ed was elected as the convener of the Working Group on Messaging and Communications. This working group created the first standards coming out of the ISO effort. Ed clearly has established a trusting relationship among the international community. He also spearheaded the ISO/HL7 pilot process in which HL7 standards could move directly for approval as ISO standards.

*Joachim Dudeck, MD, Chairman of Medical Informatics, University Hospital in Giessen:* "Standardization in health care is not imaginable without the initiatives and the work of Ed Hammond. By his many and always excellent, knowledgeable, and impressive presentations he motivated people in the U.S. and in the international arena to join these efforts. Without any doubts he is one of the fathers of the constitution of standardization in health care."

Ed has advocated for what we now call the National Health Information Infrastructure (NHII) since the early 1990s. As Chair of the Computer-based Medical Record Institute, he introduced a proposal for the acceleration of the adoption of the computer-based patient record, identifying barriers and making specific recommendations on how to overcome these barriers by specific actions. More recently, he was chosen to be the chair of the Data Standards Working Group for the Connecting for Health Initiative. This group made recom-



Dr. Hammond (third from left) during a naval exercise.

mendations for the identification and acceleration of necessary health data standards. He is a member of the Institute of Medicine (IOM) Patient Data Standards Committee. He is the bridge between that committee and HL7 regarding electronic health record functionality standards.

*Carol Diamond, MD, MPH, Managing Director, Markle Foundation:* "Ed's passion, energy, and drive for the area of standards and informatics in health care are unparalleled. We greatly benefited from his leadership and guidance and came to call him our guru in 'Connecting for Health' because he seemed to always be able to figure things out, and that always made us feel a little bit better."

## Organized Medical Informatics

Ed has worked to build each of the medical informatics organizations that existed during his career. He served two terms as chair of the Special Interest Group on Biomedical Computing (SIGBIO) of the Association for Computing Machinery (ACM). He served on the American Association of Medical Systems and Informatics (AAMSI) board as well as program chair for two meetings. He was part of the forming group of the American Medical Informatics Association (AMIA) and has served on the board continuously—as President, Treasurer, and Chair of the Membership Committee for six years. Along the way he served ACMI in many roles, including President. He is a founding fellow of ACMI and a founding member of the American Institute for Medical and Biological Engineering (AIMBE). HL7's Volunteer of the Year Award is named after Ed. In 2003, Ed received the Paul Elwood Award for lifetime achievements from the Foundation for Accountability.

*Mark McDougall, Executive Director, Health Level 7:* "Ed is informed, well published, and highly respected. He is a teacher, an encourager, a mentor freely giving his time and talents to progress the work of our organization and those who participate in it. His intelligence, humor, and never-ending enthusiasm have inspired others to invest their time and talents in HL7. Years ago Ed shared with me some valuable insight. He told me that he believed that HL7's most valuable asset was not the

standard that we produce but instead it is the collection of brilliant and dedicated people that HL7 was able to track and retain.”

### Naval Career

Dr. Hammond had an unusually active 33-year career in the U.S. Naval Reserve, retiring in 1989 as a Captain. During that period, he served as the commanding officer of several units, including Emergency Response Team 6, which had no active-duty equivalent. He created an underwater navigation system for unmanned deep submersibles. This system was used for the recovery of several aircraft that crashed at sea and for mapping the debris field for the Challenger spacecraft. Captain Hammond participated in several of these exercises directly.

### Conclusion

Ed Hammond is truly a pioneer in the tradition of Morrie Collen; he does what others think cannot be done, he works with others, and is trusted as a partner. As a result, he is sought out internationally as the expert on what is achievable

related to health records and standards. It is with pride, admiration, and affection that the College recognizes his achievements with the Collen Award.

*Donald Lindberg, MD, Director, National Library of Medicine: “I don’t imagine there was a time in the history of medical informatics when Ed Hammond wasn’t present and smiling and encouraging the rest of us to do what was important to the field. I don’t know when I met him, but I guess at least by 1971 when he was making TMR, a patient-based patient record system at Duke, using a minicomputer. That system was probably getting more done with a mini-computer than most of us were getting with what we then thought of as mainframe computers. But he stuck with it. Probably the contribution that everyone knows about from Ed is his insistence that we develop standards and that we perfect them, even if that takes decades and it turns out, it has. For that, we owe him a really great debt and I’m happy to see that debt partly paid by this well-deserved award today.”*